2

Expert Rebuttal Report of John Downie

WEST VIRGINIA RIVERS COALITION, INC.

v.

THE CHEMOURS COMPANY FC, LLC

United States District Court

Southern District of West Virginia at Charleston

Civil Case No. 2:24-cv-00701

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Table Of Contents

I. Qualifications and Compensation

I have been a practising economist since graduating from the business school at the University of Rochester with an MBA with a concentration in finance, in 1995.

From 1997 through 2002 I was an associate, then a senior associate in the finance group of the Brattle Group, an economic consulting firm. I worked closely with Brattle Group partner and MIT Finance Professor Stewart C. Myers on several engagements over this period. The engagements, which focused on questions of valuation and the applied understanding of risk and return, included both litigation and regulatory matters.

I have been analyzing economic benefit for over 25 years and in approximately 100 matters.

I receive compensation of $650 per hour for my work on this report and for my testimony at trial.

II. Summary of Opinions

The key economic input in an economic benefit analysis is the rate at which it is assumed that past cash flows are escalated to properly calculate their present values.

Jonathan S. Shefftz used an estimate of what he called "the firm-wide WACC" for Chemours for the rate that he applied to his present value adjustments of the on-time and delay costs, incorporating what he referred to as "company-specific data."

Mr. Shefftz characterizes his calculations as reflecting either of two, mutually exclusive underlying theories.

For the reasons set forth below, Mr. Shefftz' methodology for determining the rate to apply to his present value adjustments of the on-time costs is speculative, counterfactual, inconsistent with established economic theory, and improper.

III. Rebuttal Opinions

A. Summary of My Approach

Economic benefit is the amount by which a company is better off due its failure to comply with environmental regulations.

As a result of the savings from noncompliance, Chemours had more money than it otherwise would have, starting in 2022. From an economics perspective, Chemours essentially got interest-free loans, in the amounts of the costs that were delayed or avoided. The economic benefit of noncompliance was that Chemours paid no interest on these loans. We can now remove this benefit by charging the company appropriate interest rates on the loans, which captures any benefit received by Chemours due to noncompliance.

Delayed expenses are charged interest that reflects the historical rates paid to lenders, while avoided costs are charged interest and include the repayment of "principal", reflecting the net amounts of the avoided costs.

The escalation rates in my economic benefit calculations are based on Mr. Shefftz's calculations of the weighted average interest rates Chemours paid on its long-term debt. Since money is fungible, it is not possible to track the path of any particular dollar to a particular use. The use of Chemours' actual debt rate fully captures all economic benefit and requires no speculation as to what the company did with particular monies.

B. Finance Theory and Economic Benefit

i. Discounting Future Cash Flows and Escalating Past Cash Flows

To calculate economic benefit, all relevant actual and hypothetical costs, in both the future and the past, must be adjusted to establish their values as of a single date. This requires the application of present value factors that reflect the timing and risks associated with those cash flows.

The recommendations of an EPA Peer review panel outline the correct approach:[1]

Future Cash Flows

- Future cash flows should be discounted back to present value using a Weighted Average Cost of Capital (WACC).

Past Cash Flows

- Penalties should be escalated from the Noncompliance Date to the Penalty Payment Date using the long-term corporate borrowing rate.

The Future: The Weighted Average Cost of Capital (WACC)

The WACC is a forward-looking hypothetical cost which consists of two component costs of capital. The first component is an observable number, **the expected cost of debt**. The second is a conceptual number, **the expected cost of equity**. As Mr. Shefftz acknowledges, the WACC is an *expected* return.[2]

The Expected Cost of Debt

The expected cost of debt capital is generally assumed by practitioners to be the same as the current cost of debt. In most cases this is a reasonable assumption.[3] The cost of debt is a concrete, observable number. One can determine, for example, that the yield (cost) on a company's debt is 8%.

The Expected Cost of Equity

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[1] Deems Buell, Marc Blaustein, *Decisions about BEN Discount Rates*, Temple, Barker, Sloan, August 22, 1988.
[2] Shefftz, p. 11.
[3] There may be cases where a firm is in financial distress, for example, where a closer examination of this assumption is warranted.

The expected cost of equity is a purely forward-looking, conceptual cost. When issuing equity, a company sells an ownership stake to outside buyers, who are hoping to receive a good return on their investment. The cost of equity isn't observable – a stock certificate isn't stamped with a return of 15%, for example. It is an estimate of the market's expected return requirement for bearing an expected level of risk.

The WACC

The WACC is a combination of the costs associated with an observable number, the interest rate on a company's debt, and a conceptual number, an estimate of the expected return the market requires for bearing the expected risks associated with the equity investment.

Discounting Future Cash Flows

The value of a business is the present value of its future cash flows. Finance professionals routinely undertake the evaluation of real investment opportunities, like projects, as well as operating businesses. The standard approach to valuing a business is a discounted cash flow (DCF) analysis, based on the projected, future revenues and costs of the business.

Cash flows that are projected to occur in the future are inherently uncertain. The standard approach to calculating their present values is to apply an interest rate that includes a risk premium that reflects the uncertainty of the cash flows. A standard, textbook approach to calculating present values of these uncertain cash flows is to "discount" them using the firm's cost of capital (WACC). The underlying logic is that cash flows projected in the future are worth less today, and that the riskier they are, the less they are worth in present value terms. The "discount" reflects the riskiness and timing of the cash flows in question.

In calculating economic benefit, Mr. Shefftz applied the WACC as a discount rate to calculate the present values of future cash flows. This approach is consistent with standard practice and the recommendations of the EPA Peer Review Panel. I have adopted Mr. Shefftz's WACC rate and applied it to calculate the present values of future cash flows.

Escalating Past Cash Flows

To calculate economic benefit, it is necessary to establish the present values of hypothetical cash flows that are assumed to have occurred in the past. This is not an activity that is routinely undertaken by finance professionals. In a corporate environment, revenues and costs are booked on an income statement, profits are calculated, taxes are paid, and so on. There is no need to calculate the present value today of old cash flows.

Mr. Shefftz Calculated the Hypothetical Past Compliance Cash Flows

In his economic benefit analysis, Mr. Shefftz calculated the values of the compliance costs as they would have been incurred starting in 2022, in his on-time scenario. He did this by applying different cost indices to different categories of costs to arrive at estimates of the avoided and delayed costs. While these cost estimates might not precisely match the actual, historical costs that would have been incurred, they are not "risky" as defined in finance.

Finance theory tells us that it is the riskiness and timing of cash flows that are relevant in establishing their present values. Because there is no risk associated with past cash flows, it is incorrect to apply a risk premium to establish their present values. Mr. Shefftz has applied a substantial risk premium in his calculations of the present values of known, past cash flows. This error leads to a significant, arbitrary inflation of his calculations. The penalty amounts that flow from Mr. Shefftz's inapt application of a risk premium do not reflect economic benefit.

C. Mr. Shefftz's Approach to the Calculation of Economic Benefit

Mr. Shefftz's economic benefit analysis is based on a series of speculative and counter-factual assumptions, the results of which simply reflect his arbitrary choices.

Mr. Shefftz posits two, mutually exclusive alternative theories regarding the underlying causation and mechanisms through which he believes Chemours gained economic benefit due to its failure to comply with certain environmental requirements, writing:

> Economic benefit is simply a term for the financial gains that accrue through such delayed and/or avoided expenditures. Funds not spent on environmental compliance are available for financially productive economic activities or, alternatively, the costs associated with obtaining additional funds for environmental compliance are avoided.[4]

So, Mr. Shefftz believes that Chemours gained economic benefit either by investing noncompliance savings in new investments *or* avoiding the costs of obtaining funds. Despite the disparate explanations, Mr. Shefftz employs only one financial model which generates a single set of calculations, with precisely the same economic benefit conclusion. It isn't at all clear what Mr. Shefftz means with the second alternative scenario. This report focuses on the first alternative, though many of the errors Mr. Shefftz made are independent of the underlying explanation.

i. Mr. Shefftz's Calculations are not Related to the Noncompliance

Under Mr. Shefftz's first alternative theory, his economic benefit calculations are premised on his assumption that Chemours took noncompliance savings and made risky investments with them. Because Mr. Shefftz ascribes the returns that he assumes these investments made to economic benefit, he is also assuming that Chemours made the investments *solely* due to the availability of noncompliance savings.

In other words, Mr. Shefftz's economic benefit calculations are predicated on the assumption that Chemours invested the savings in risky projects, and that it would not have made those same investments absent the noncompliances.

In his report, Mr. Shefftz explains that the accrual of economic benefit doesn't require that a defendant had any awareness of the underlying noncompliance, writing:

[4] Shefftz, p. 7.

> Economic benefit is "no fault" in nature: companies need not have deliberately chosen to delay compliance (for financial or any other reasons) – or in fact even have been aware of the noncompliance – to have accrued the economic benefit of noncompliance.[5]

Mr. Shefftz's economic benefit calculations, however, are dependent on the assumption that the defendant was aware of not only the noncompliance in general, but also the specific amounts and timings of the delayed and avoided costs associated with the noncompliance. Absent this information, there is no way that the company could have made the investments with noncompliance savings that are the source of economic benefit in Mr. Shefftz's analysis. Mr. Shefftz's calculations, therefore, rely on a foundation that is entirely without factual support or evidence.

A standard framework for the analysis of corporations is to assume they are profit-maximizing. They would like to make good investment decisions and avoid making poor investment decisions. As I show below, this premise undermines Mr. Shefftz's analysis.

Let's imagine we have a company without a capital constraint - if it finds a promising investment that passes all of the internal analytical and control mechanisms, the company has sufficient monies to fund the investment. In this case, the company would undertake all of the investment projects it believes will be profitable, subject to constraints related to its ability to manage and staff the projects.

For example, a company might analyze five potential investments and conclude that three of them are attractive enough to risk the investment in them.

Given this premise, Mr. Shefftz's economic benefit analysis makes no sense.

Mr. Shefftz's use of the WACC as an escalation rate is premised on the assumption that noncompliance savings were invested in risky projects. Because Mr. Shefftz bases his economic benefit calculations on the risky returns of these projects, he is also assuming that, absent the noncompliance savings, Chemours would not have undertaken precisely the same investments - economic benefit must be tied, causally, to the noncompliance.

Mr. Shefftz doesn't explain why Chemours actually undertook the investments that he assumes they made with noncompliance savings but would not have made those same investments in any case.

The sole, logical reason that might explain this difference in investment decision-making is that Chemours had an actual capital constraint, which meant that the funding of the assumed investment was possible *solely* because of the presence of noncompliance savings.

Did Chemours have a capital constraint starting in 2022 that would support Mr. Shefftz's approach?

Mr. Shefftz offered Table 6 in support of his analysis of Chemours' ability to pay a civil penalty. Based on his analysis of the financials, Mr. Shefftz opined that "Chemours could afford the

[5] Shefftz, p. 7.

financial amounts potentially at issue in this case."[6] Chemours was in at least as strong a financial position in 2022, when the bulk of the compliance costs would have been incurred, as it was over the period which Mr. Shefftz examined in rendering his opinion.

If there was no capital constraint that made the noncompliance savings a necessary predicate to fund Mr. Shefftz's assumed investments, the only reasonable conclusion is that Chemours would have made precisely the same investments, with or without noncompliance savings. Given this, the returns that Mr. Shefftz's believes his assumed investments generated simply do not represent economic benefit.

Share Repurchases

Companies operating in mature industries, like chemicals, might be in a position where they generate operating cash flows but do not have a lot of investment opportunities in which they can prudently invest. This situation of having more cash than can be prudently deployed leads many firms to undertake share repurchase programs. Instead of issuing stock and getting cash from shareholders, the company does the opposite and returns cash to shareholders. This reversal reflects a lack of attractive investment opportunities.

In 2022, Chemours returned $649,000,000 to shareholders, including $495,000,000 in share repurchases. The funds used for share repurchases provide no direct return to the company.[7] Given the scale of these repurchases, we can confidently conclude that Chemours did not face a capital constraint that would have precluded its ability to make all of the investments that it deemed prudent, up to that amount. If there is no difference to the company's investment decision-making between the actual world and the hypothetical, compliant world, then Mr. Shefftz's calculations do not represent economic benefit.

Risk and Return

We know that, without bearing any risk, an investor can buy U.S. Treasury securities and enjoy risk-free, certain returns. If an investor wants to have the opportunity to earn returns higher than the risk-free rate, they must bear risk. This is the common-sense foundation of finance.

The Capital Asset Pricing Model (CAPM) was developed as a tool to calculate expected returns. The underlying assumption of CAPM is that there is a linear relationship between the amount of risk one is willing to bear, and the additional return one can *expect* by bearing that risk. CAPM is a forward-looking concept that facilitates the evaluation of uncertain cash flows projected to occur in the future. Expected returns are uncertain.

As Mr. Shefftz wrote:

> The equity cost of capital is based upon the Capital Asset Pricing Model ("CAPM"), which states that investors will demand a return from a risky investment that is equal to the return

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[6] Shefftz, p. 30.

[7] Chemours 2022 Annual Report, Introduction. Share repurchases send the signal to the market that the company isn't going to make imprudent investments with the cash it is generating.

> on a risk-free investment plus an additional return to compensate for the additional risk taken on by the investor.[8]

Mr. Shefftz calculated expected returns for each year starting in 2022 using CAPM. Each of these calculations was entirely forward-looking. Mr. Shefftz's 2022 estimate of the required expected return to equity, for example, was based on historical risk premium using data from 1926 – 2021. The 2023 estimate used data from 1926 – 2022, and so on. These calculations, therefore, represent ex-ante expectations about future returns. This approach is consistent with how a financial analyst would evaluate projected, future cash flows, since all of the data would, by definition, predate the projected cash flows to which they are applied.

Mr. Shefftz concluded that the expected return required to compensate an investor for bearing the risk of an equity investment in Chemours equity was between 14% and 15% for the 2022 – 2025 time period.

ii. Expected Returns are Not Predictive of Actual Returns

To calculate economic benefit, Mr. Shefftz assumes that the expected returns that he calculated were actually realized, like clockwork, on the investments he assumes were made with noncompliance savings. So, Mr. Shefftz is using expected rates of returns as his measures of the economic benefit Chemours actually received in this matter. As I show below, this approach is inconsistent with economic theory and with the facts of this case. Setting aside these fatal problems for a moment, how does Mr. Shefftz's approach fare as a tool to calculate economic benefit?

Mr. Shefftz defines economic benefit in his report:

> Economic benefit is the amount by which companies (such as Defendant in this case) are financially better off as a result of not having complied with environmental requirements in a timely manner.[9]

Note that the definition is related not to expectations, but to the actual degree the defendant is better off due to noncompliance. The Clean Water Act also refers to actual, not expected economic benefits.[10]

So, for Mr. Shefftz's approach to have the potential to be useful in the calculation of economic benefit, the expected returns he calculates would have to be reasonably accurate predictors of actual returns.

The question regarding the degree to which expected returns are accurate predictors of realized returns has been thoroughly explored by academics, going back decades.

The conclusion, over and over, is that expected returns estimated with CAPM are worthless as predictors of realized returns. For example, in 2016 Dr. Matthew R. Lyle (Northwestern), Dr. Charles C.Y. Wang (Harvard), and Dr. Akash Chattopadhyay (Harvard), undertook research of the

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[8] Shefftz, p. 11.
[9] Shefftz p. 7.
[10] Clean Water Act, 33 U.S.C. Section 1319(g)(3).

utility of the CAPM in predicting actual stock returns. They concluded that there was "no evidence whatsoever that the CAPM can predict stock returns."[11]

Mr. Shefftz's economic benefit calculations are reliant on the assumption that CAPM expected returns are reliable estimate of actual returns. Given that this premise is demonstrably false, Mr. Shefftz's calculations are not reliable estimates of economic benefit.

iii. Mr. Shefftz Decouples Risk and Return

Mr. Shefftz's economic benefit calculations are predicated on the assumption that expected CAPM returns are reliable predictors of actual returns and therefore are a reasonable basis for the calculation of economic benefit. As explained above, this is an entirely counterfactual and erroneous assumption. An important corollary of Mr. Shefftz's approach is that risk and return are not actually connected to each other.

In theory and reality, the higher the expected return associated with an investment, the lower the probability that the return will actually be achieved. This is the trade-off an investor must make in order to have access to the potential of higher returns.

The approach Mr. Shefftz applies in his economic benefit calculations ignores, entirely, this trade-off. Higher risk leads to higher *expected* returns, and in Mr. Shefftz's view, higher *realized* returns. This assumption is obviously false.

In 2022, Mr. Shefftz calculated an expected return to Chemours equity of 14.41%, which is based on a risk-free rate of 3.30 percent and a risk premium of 11.11%. If Mr. Shefftz is correct, and stocks reliably generate at least their expected rates of return, there would be no market at all for government bonds at 3.30% for example, if equity investments with expected *and* reliably-realized returns of 14.41% were available. The existence of a U.S. Treasury market that exceeds $36 Trillion as of July 17, 2025, convincingly disproves the premise undergirding Mr. Shefftz's economic benefit calculations.

Shefftz Table 2

Table 2

CHEMOURS COMPANY-SPECIFIC WEIGHTED-AVERAGE COST OF CAPITAL

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)
					After-		Long-Term			Long	Company				Average
	Cost of	Marginal Tax Rate:			Tax	Debt	Treasury	Equity Beta:		Horizon	Risk	Equity	Equity	Annual	through:
Year	Debt	WV	U.S.	Combine	Cost	Weight	Notes	Raw	Adj.	Risk Prem	Premium	Cost	Weight	Rate	2025
2022	5.15%	6.50%	21.0%	26.14%	3.80%	59.19%	3.30%	1.7346	1.4898	7.46%	11.11%	14.41%	40.8%	8.13%	7.84%
2023	6.42%	6.50%	21.0%	26.14%	4.74%	63.79%	4.26%	1.7529	1.5020	7.17%	10.77%	15.03%	36.2%	8.47%	7.74%
2024	6.34%	6.50%	21.0%	26.14%	4.68%	68.23%	4.50%	1.6333	1.4222	7.17%	10.20%	14.70%	31.8%	7.86%	7.38%
2025	6.26%	6.50%	21.0%	26.14%	4.62%	77.19%	4.79%	1.5455	1.3637	7.17%	9.78%	14.57%	22.8%	6.89%	6.89%

iv. Time Value of Money

[11] *Your Investment Tool Is Failing You,* Kellog Insight - A magazine of research and ideas from the faculty of the Kellogg School of Management, Northwestern University, June 6, 2016.

The concept of the time value of money is based on the idea that a dollar received today is worth more than a dollar received in the future, because one has opportunities to invest the dollar one has today.

As explained in Fundamentals of Corporate Finance:

> Money can be invested to earn interest. If you are offered the choice between $100,000 now and $100,000 at the end of the year, you naturally take the money now to get a year's interest. Financial managers make the same point when they say that money in hand today has a time value or when they quote perhaps the most basic financial principle: **A dollar today is worth more than a dollar tomorrow** [emphasis in original].[12]

This definition was included in the EPA BEN Model User's Manual, 1999.

> The economic benefit calculation must incorporate the economic concept of the "time value of money." Stated simply, **a dollar today is worth more than a dollar tomorrow,** [emphasis added] because you can invest today's dollar to start earning a return immediately. Thus, the further in the future the dollar is, the less it is worth in "present-value" terms.[13]

Mr. Shefftz defines the time value of money on page 9 of his report.

> The economic benefit calculation incorporates the concept of the "time value of money." For example, in simple terms, **a dollar yesterday is worth more than a dollar today**, because one **had** [emphasis added] investment opportunities for yesterday's dollar. Thus, the further in the past that the dollar was obtained, the more it is worth in "present-value" terms.

Mr. Shefftz has twisted the concept, temporally, by substituting the past for the future. This temporal confusion undergirds both the theory and the mechanics of his economic benefit analysis.

Mr. Shefftz's recasting of the time value of money is simply incorrect. An opportunity can have value, by definition, only prospectively. There is no value, *per se*, in having had an opportunity in the past. Yesterday we *had* an opportunity. Today, we have an outcome. If yesterday we had invested the dollar in a U.S. Treasury security, then we can safely conclude that we have more than a dollar today. Outside this single case, we can make no truthful, general statement that we have more than a dollar today. If we invested the dollar in a risky investment for example, then we could very well have less than a dollar today. It is possible that we lost the entire dollar.

Mr. Shefftz claims that he used standard finance approaches in his economic benefit calculations.

> To calculate economic benefit, I use standard financial cash flow and net present value analysis techniques, based on modern and generally accepted financial principles. Such an approach is the underpinning of any capital budgeting exercise, and is the standard

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[12] Brealey, Myers, Marcus, Fundamentals of Corporate Finance, ninth edition, p. 123.
[13] EPA BEN User's Manual, 1999, p. 1-3.

> approach by which alternative investments should be judged according to any financial economics or corporate finance text.[14]

Mr. Shefftz calculated expected returns using CAPM, which is a standard approach to evaluating future cash flows. Using expected returns in capital budgeting and to evaluate alternative investments is consistent with standard corporate finance practice.

The specific language used, however, conveys the relevant temporal context. Capital budgeting and evaluating alternative investments are inherently forward-looking exercises. Financial analysts use the approach to allocate corporate resources and to evaluate potential investments, perhaps choosing among mutually exclusive alternatives.

These capital budgeting and investment evaluation activities have nothing to do with Mr. Shefftz's application of the approach. Mr. Shefftz simply assumes that any investments made paid off precisely as expected. Every evaluation, using Mr. Shefftz's approach, would conclude that every investment was perfectly successful, tautologically. Mr. Shefftz's specific use of the tools is simply inapt.

v. Real World Test

In justifying his approach, Mr. Shefftz wrote:

> The cost of capital therefore represents the minimum expected return a company can earn on average on monies not invested in pollution control.

In forming his opinions, Mr. Shefftz gathered and analyzed the actual returns for Chemours's stock, which are reflected in his Table 2c. He used these returns to calculate expected returns, which he then assumed Chemours accrued on noncompliance savings.

How did Mr. Shefftz's calculated, expected equity returns compare to Chemours' actual returns? An obvious test of Mr. Shefftz's approach is to compare the returns that he *assumes* Chemours actually earned on investments it made with noncompliance savings, and Chemours' actual returns over the same time period.

Let's imagine that on January 1, 2022, we invested $1,000 in actual Chemours stock.[15] Let's also assume we invested $1,000 in an investment with the same annual rates of return that are embedded in Mr. Shefftz's economic benefit calculation.

Figure X, below, compares the values of the two investments over time.

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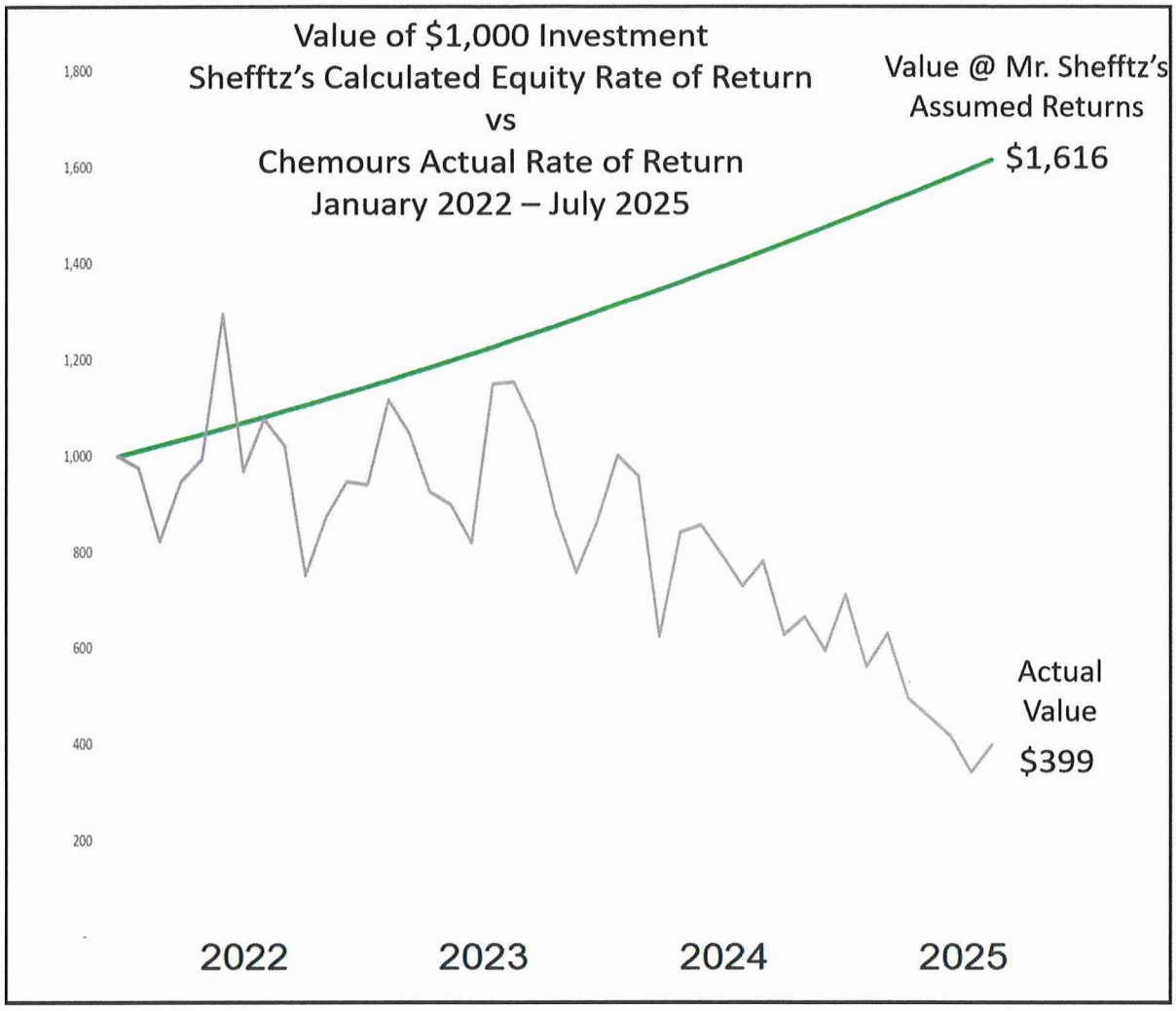
[14] Shefftz, p. 9.
[15] Based on Shefftz Table 2c, CC- Adjusted Close.



Investing in the real world is a risky proposition. The opportunity to earn higher rates of return brings significant downside risk. The actual investment in Chemours declined from $1,000 to $399, a 60% decrease over the January 2022 to June 2025 period. In stark contrast, the equity returns on which Mr. Shefftz bases his economic benefit calculations lead to a 60% *increase* in value. For Mr. Shefftz, risk is a one-way street, where the more risk you bear, the better off you are. In this case, Mr. Shefftz's approach leads to an assumed investment value that is 400% of the actual investment value.

vi. Securities and Exchange Commission Rules For Financial Advisers

The U.S. Securities and Exchange Commission (SEC) has very clear guidelines that bar investment advisers for even suggesting that past returns are a guarantee of future returns.[16] Mr. Shefftz's economic benefit analysis is based on the premise that past returns allow him to perfectly predict future returns.

[16] Securities and Exchange Commission, 17 CFR Parts 230, 239, 270, and 274.

D. Probability Adjustments and Deterrents

Mr. Shefftz includes a section in his report in which he advocates for the application of a penalty multiplier to economic benefit, based on the probability of detection, prosecution, and penalty payment, writing:

> This aspect (adjustment for the probability of detection, prosecution, and ultimate payment) of penalty setting is so compelling that it was raised by a peer review panel of U.S. EPA-convened academic experts in *An Advisory of the Illegal Competitive Advantage (ICA) Economic Benefit (EB) Advisory Panel of the EPA Science Advisory Board* even though the charge questions were entirely unrelated to this aspect. (I am intimately familiar with the charge questions, as I managed under contract to EPA the "White Paper" document that the panel was reviewing.)[17]

In describing his approach, Mr. Shefftz wrote:

> If Defendant in this case knew that for every similar violation the probability of ultimately paying a penalty that recaptured economic benefit was only 25 percent (i.e., one-fourth), then the economic benefit result would have to be multiplied by a factor of four for penalty-setting purposes. As the probability of detection-prosecution-payment declines, then the amount of money proportionately increases that would make a defendant indifferent between compliance versus noncompliance.[18]

Mr. Shefftz made the identical arguments with regard to probability adjustment in an expert report, "Analysis of Unjust Enrichment" in *Maria Aguinda et al. v. Chevron Corporation* (the "Chevron Case") which he authored in 2010.

> If ChevronTexaco in this case knew that for every noncompliant company in the industry, the probability of ultimately paying a penalty that recaptured unjust enrichment was only 25 percent (i.e., one-fourth), then the unjust enrichment result would have to be multiplied by a factor of four for penalty-setting purposes. As the probability of detection-prosecution-payment declines, then the amount of money proportionately increases that would make the company indifferent between compliance and noncompliance. Unfortunately, even rough estimates of these probabilities (whether industry- or medium-specific) are unavailable.[19] [20]

Dr. Clifford S. Russell was a member of the Economic Benefit (EB) Advisory Panel of the EPA Science Advisory Board that issued the report on which Mr. Shefftz relies for the logic that undergirds his probability adjustment discussion. Dr. Russell filed an affidavit in the Chevron Case

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[17] Shefftz 2025, p. 7-8.
[18] Shefftz, p. 7.
[19] Jonathan S. Shefftz, "Analysis of Unjust Enrichment" *in:* Maria Aguinda et al. v. Chevron Corporation, Case No. 002/2003 Court of Justice of Nueva Loja, September 13, 2010.
[20] Note that Mr. Shefftz excluded the caveat regarding the complete unavailability of probability data in his report in this matter, dated July 4, 2025.

in response to Mr. Shefftz's report. In the affidavit, Dr. Russell explains the fatal flaws in Mr. Shefftz's reasoning.

> Based on my review of Shefftz's analysis, I conclude that he uses the multiplier idea inappropriately. The purpose of the multiplier is to ensure that the expected value of the penalty is large enough to make future noncompliance economically undesirable for the potential violator, even when the probability of detecting a violation is low. Use of a multiplier does not serve this purpose where, as here, detection of the supposed violation has already occurred. In fact, a major conceptual and practical problem with the *ex post* application of this concept by Shefftz is that any choice of a probability number is necessarily arbitrary.

Dr. Russell continued:

> The theoretical basis for the use of the probability of detection/prosecution in defining the lower bound for the penalty for violation rests on the assumption that the decision to comply or violate is made in advance by a decision-maker in possession of the facts, including, importantly, the probability of detection and prosecution estimated by the enforcement agency. Shefftz does not address or support the validity of applying this probability concept in circumstances outside its customary use in deterrence theory,
>
> For this proposed adjustment to be at all valid, p the probability, must be estimated in a reasonably convincing way; it cannot just be picked out of the air arbitrarily. Indeed, the EPA expert panel went to some lengths to try to persuade EPA that p could be estimated for use in defining future penalties (Section 6.3 of the panel's report). The factors and techniques discussed there are not addressed in any way by Shefftz, and he provides no evaluation of the level of government oversight or transparency of operations in Ecuador as a justification for choosing any particular probability.
>
> There is nothing in the panel's report that suggests or supports the use of a factor corresponding to $1/p$ to "adjust" an estimate of avoided costs in present value terns for a "violation" in a setting in which p was not estimated/defined and the rule $F > CA/p$ was not specified to potential violators in advance, In fact, in such a situation, where the "violation" has been discovered and is currently the basis of legal action, the only defensible value of p would be 1.0, since discovery has in fact occurred, and the "trial" is underway, Shefftz does not introduce any argument in principle for, or any technique that might be applied in practice to produce a p less than 1.0 for the situation at issue.
>
> In sum, Shefftz takes the concept of probability-based adjustments to EPA's civil penalty definition, which were considered and recommended by the ICA Advisory Panel, out of the context in which they are justified. In the context of a post-detection damages action

claiming to seek to recoup avoided costs, there is no basis for a detection/prosecution probability adjustment.[21]

The deterrence approach proposed by Mr. Shefftz is inherently relevant only if it might change future behavior and decision-making. As Dr. Russell points out, there is no probabilistic uncertainty in cases that are underway. Adding an arbitrary probability multiplier here has no impact on deterrence.

Mr. Shefftz's temporal confusion fatally afflicts both his probability adjustment analysis and his economic benefit calculations.

E. EPA Peer Review of BEN Methodology

Background

In 1988, EPA undertook a peer review of the financial methodology embedded in its BEN model, which it uses to calculate economic benefit. They sought the insights and advice of two of the most prominent and well-regarded finance thinkers of the past 50 years: MIT Professor Stewart C. Myers, and University of Chicago professor Merton Miller.[22]

Professor Stewart C. Myers is the co-author of *Principles of Corporate Finance*, one of the standard finance textbooks used in business schools around the world for over 30 years.

Merton Miller is considered one of the fathers of modern finance. In 1958, professor Miller, along with MIT professor Franco Modigliani published the seminal work *The Cost of Capital, Corporate Finance and the Theory of Investment*. Together, the professors developed what became know as the Modigliani-Miller Theorem (M&M Theorem) which is still at the core of finance theory. In 1990, Professor Miller was awarded a Nobel Memorial Prize in Economic Sciences.

i. Peer Review Recommendations

The peer review focused primarily on the question of what interest rates are appropriate to apply to future cash flows, and what rates are appropriate to escalate cash flows assumed to have materialized in the past. The conclusions of the peer review were:

- Future cash flows should be discounted back to present value using a Weighted Average Cost of Capital (WACC).
- Penalties should be escalated from the Noncompliance Date to the Penalty Payment Date using the long-term corporate borrowing rate.
- The WACC should be calculated using long-term rates.
- The appropriate WACC should be determined by industry sector at the two-digit SIC code level, and should account for variations in capital structure, by sector.

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[21] Dr. Clifford S. Russell, *Evaluation of Jonathan Sheffiz's Analysis of Damages to be Claimed from Chevron in Connection with Oil Field Operations in Ecuador and his use of the Report of the US EPA Science Advisory Board's Advisory Panel on "Illegal Competitive Advantage"*.

[22] Deems Buell, Marc Blaustein, Decisions about BEN Discount Rates, Temple, Barker, Sloan, August 22, 1988.

In support of the approach that he applied to calculate economic benefit, Mr. Shefftz included a discussion of this peer review, writing:

> Note that this 1991 peer review was a follow-on to an earlier 1988 U.S. EPA sponsored academic peer review of the BEN model. In the 1988 academic peer review, Deems Buell and Marc Blaustein, from Temple, Barker & Sloane (TBS), Inc., the EPA contractor facilitating the peer review, summarized the position of the three peer reviewers as follows:
>
> > The most defensible and conservative **escalation rate** is the corporate borrowing rate [emphases added], although a reasonable argument supports the use of WACC. [...] the WACC is the firm's overall borrowing rate and the return it most likely received on money from the government "loan" if the capital was invested in the firm's typical projects during the noncompliance period.
>
> This was confirmed by Charles Upton; then Associate Professor, Graduate School of Management, Rutgers University (now Professor Emeritus of Economics, College of Business Administration, Kent State University), in a letter in which he stated, "The approach which TBS has outlined in their August 22 memorandum is a reasonable approach to the problem, and one which I support."[23]

Mr. Shefftz characterizes the double-indented paragraph above as a summary of the positions of the peer reviewers. It is not. The passage is an aside included in the second half of a discussion of the escalation rate on page three of the four-page memo. It isn't clear that the position Mr. Shefftz ascribes to the peer reviews are attributable to them at all. There is nothing to suggest this in the actual writings of the peer reviewers. In any event, it is clearly not a summary of the peer reviewers' positions.

Mr. Shefftz is stating that Professor Charles Upton confirms the position that there is a reasonable argument that supports the use of the WACC as an *escalation* rate. Mr. Shefftz excluded critical context from Professor Upton's written statement which makes clear that he was referring *not* to the escalation rate in his comments as Mr. Shefftz suggests but was instead referring to the *discount* rate.

The full text of Professor Upton's letter reads:

> Dear Mr. Libber,
>
> As requested, I have spent some time reviewing the way in which the BEN model handles the problem of **discounting** [emphasis added] cash flows.
>
> The problem of the appropriate **discount rate** [emphasis added] is, in general, a difficult one, and the BEN model is no exception to the rule. The approach which TBS

[23] Shefftz, p. 14.

has outlined in their August 22 memorandum is a reasonable approach to the problem, and one which I support.

Please let me know if I may be of any further assistance.

Sincerely yours,
Charles Upton[24]

Mr. Shefftz's confusion and conflation of *escalation rates* and *discount rates* is misleading and misrepresents the recommendations made by the peer reviewers. It is clear that they recommended the use of the corporate debt rate as the proper escalation rate, which I have used, and not the WACC rate, which Mr. Shefftz has used.

F. Economic Benefit Calculations versus Tort Damages Calculations

Mr. Shefftz attempts to distinguish the calculation of economic benefit from the calculation of compensatory damages in a tort case, writing:

> Economic benefit does not represent compensation to a plaintiff as in a typical "damages" calculation for a tort case. Instead, economic benefit is the minimum amount that a defendant must pay as a civil penalty so as to return that defendant to the financial position it would have been in had it complied in a timely manner. Therefore, were the economic benefit not to be fully disgorged in the form of a civil penalty payment, then the residual financial gain could be construed as representing an unfair competitive business advantage to a defendant.[25]

The passage doesn't provide any reasoning that supports the idea that there is a difference between the calculation of economic benefit from the calculation of compensatory damages in a tort case. The economic theory on the calculation of the time value of money in a tort case was explained in Principles of Corporate Finance, a standard finance textbook.

> All of the examples in this section are forward-looking; they call for the value today of a stream of future cash flows. But similar issues arise in legal and contractual disputes when a *past* cash flow has to be brought forward in time to a present value today. Suppose it is determined that company A should have paid company B $1 million ten years ago. B clearly deserves more than $1 million today, because it has lost the time value of money. The time value of money should be expressed as an after-tax borrowing rate or lending rate, or if no risk enters, as the after-tax risk-free rate. The time value of money is not equal to B's overall cost of capital. Allowing B to "earn" its overall cost of capital on the payment allows it to earn a risk premium without bearing risk.[26]

[24] Letter from Charles Ward Upton to Jonathan Libber. Re. discount rates in the EPA BEN Model.
[25] Shefftz, p. 9.
[26] Brealey and Myers, Principles of Corporate Finance, sixth edition (2000), p. 566.

If company A, above, pays company B compensatory damages based on the corporate debt rate, then company B is made whole.

What about A?

While B *lost* the time value of money for the ten-year period, A *gained* the time value of money. This situation for A is indistinguishable from the case of economic benefit arising from noncompliance. A had more money than it ought to have had – what is the interest rate that correctly accounts for the time value of money gained?

Using my approach, which accrues the time value of money at the debt rate, A would now be in precisely the same financial position that it would have been in, absent the tort.

Mr. Shefftz, on the other hand, would conclude that A is still better off after making B whole, because A accrued benefit at a higher rate of interest than the rate at which B was harmed. This is because Mr. Shefftz assumes the economic benefit accrues at the WACC rate.

Tables X and Y, below, compares the implications of my approach to those of Mr. Shefftz's approach, using the actual rates from his report.[27]

Table X - Downie Approach

	Starting Position	Tort	Time Value of Money (%)	Time Period (Years)	Time Value of Money ($)	Total Before Payment	Payment to B	Ending Position
Company A	$0	$1,000,000	4.50%	10	$552,969	$1,552,969	-$1,552,969	$0
Company B	$0	-$1,000,000	4.50%	10	-$552,969	-$1,552,969	$1,552,969	$0
						Total Value Created/(Destroyed)		$0

Table Y - Shefftz Approach

	Starting Position	Tort	Time Value of Money (%)	Time Period (Years)	Time Value of Money ($)	Total Before Payment	Payment to B	Ending Position
Company A	$0	$1,000,000	7.50%	10	$1,061,032	$2,061,032	-$1,552,969	$508,062
Company B	$0	-$1,000,000	4.50%	10	-$552,969	-$1,552,969	$1,552,969	$0
						Total Value Created/(Destroyed)		$508,062

Table X demonstrates that using my approach, the gains to A are identical to the losses to B, and once A makes B whole, A is in the same position in which it started.

Table Y shows the results of using Mr. Shefftz's approach. For Company A, the equivalent of a defendant in an economic benefit case, benefit accrues at a higher rate than the rate at which B is harmed. By withholding a $1 million payment to B for 10 years, A is better off by $508,062, at the same time B is whole.

It cannot be the case that real value is created through tortious actions. For example, let's imagine that A and B are separate divisions of the same company. Applying Mr. Shefftz's logic, the company could arbitrarily create value by having its divisions breach contracts with one another, accruing net gains. It can't be that a company can make profits by moving money from one pocket to another.

[27] The average after-tax debt rate calculated by Mr. Shefftz is 4.5%, and his average WACC is 7.5%.

G. Mr. Shefftz's Alternative Theory of Economic Benefit

Mr. Shefftz posits two alternative theories of how he believes Chemours gained economic benefit in this matter. The second alternative is based on the theory that Chemours avoided the costs associated with funding the compliance measures, which he believes would have been the WACC.

Mr. Shefftz doesn't explain how economic benefit could have accrued under this alternative. As explained above, the cost of capital (WACC) is a conceptual cost that reflects the assumed riskiness of the uncertain, future cash flows in question. Mr. Shefftz doesn't explain the mechanism by which Chemours would incur these costs to pay for wages to erect scaffolding, for example.

To the extent Chemours needed additional cash to pay the relevant costs, it could simply have reduced its $495 million is share repurchases.

IV. Reservations

I reserve the right to update or amend my opinions based on new information that may become available.

John Downie

Date: July 21, 2025

Appendix A

Resume of John Downie
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Mr. Downie specializes in the analysis and calculation of economic benefit and client ability-to-pay in environmental legal actions.

Over the past twenty years he has analysed and calculated economic benefit in dozens of civil matters. He has a thorough understanding of economic benefit's legislative beginnings, the evolution of EPA's policies and approaches to its calculation, as well as the underlying economic theory.

Mr. Downie earned an MBA with a concentration in finance, from the University of Rochester.

He worked for seven years in the Washington, DC offices of two large economic consulting firms on a wide range of litigation and regulatory matters, with an emphasis on the understanding, modeling and valuation of cash flows and risk.

Education

MBA, Finance, Simon Business School, University of Rochester.
Elected to Beta Gamma Sigma honor society.
BA, University of Waterloo.

Experience

2018 – Present	Principal, Greenwood Economics Inc.
2002 – 2018	Independent economic consultant
2002 – 2003	Subcontractor to Saber Partners, LLC
1997 – 2002	The Brattle Group
1995 – 1997	Putnam, Hayes and Bartlett
1994 – 1995	Teaching assistant to Professor Ross L. Watts

Testimony History for Past Four Years

State Of North Carolina v. EIDP Inc., (North Carolina Superior Court), deposition February 19, 2025.

Brunswick County v. E.I. Du Pont De Nemours And Co. (E.D. North Carolina), deposition October 16, 2024.

PennEnvironment And Sierra Club v. PPG Industries Inc., (W.D. Pennsylvania) deposition May 12, 2023, trial testimony June 10, 2024.

Appendix B

Documents Relied Upon

Shefftz, Jonathan, Expert Report, *West Virginia Rivers Coalition, Inc. v. The Chemours Company FC, LLC,* July 4, 2025.

Buell, D, Blaustein, M, TBS, review on behalf of Environmental Protection Agency, (1988). Decisions about BEN Discount Rates.

Brealey, R. A., & Myers, S. C. (2000). Principles of corporate finance (6th ed.). McGraw-Hill.

Brealey, Myers, Marcus, Fundamentals of Corporate Finance, ninth edition.

Clean Water Act, 33 U.S.C. Section 1319(g)(3).

Chemours 2022 Annual Report

Your Investment Tool Is Failing You, Kellog Insight - A magazine of research and ideas from the faculty of the Kellogg School of Management, Northwestern University, June 6, 2016.

EPA BEN User's Manual, 1999

Securities and Exchange Commission, 17 CFR Parts 230, 239, 270, and 274

Jonathan S. Shefftz, "Analysis of Unjust Enrichment" *in:* Maria Aguinda et al. v. Chevron Corporation, Case No. 002/2003 Court of Justice of Nueva Loja, September 13, 2010.

Dr. Clifford S. Russell, *Evaluation of Jonathan Shefftz's Analysis of Damages to be Claimed from Chevron in Connection with Oil Field Operations in Ecuador and his use of the Report of the US EPA Science Advisory Board's Advisory Panel on "Illegal Competitive Advantage".*

Letter from Charles Ward Upton to Jonathan Libber. Re. discount rates in the EPA BEN Model.

Chemours 2022 Annual Report